

Appl. No. : 09/998,384
Amendment Dated : February 16, 2005
Reply to Office Action of : August 25, 2004

Docket No. 005916/USA/FET/FET/DV

Remarks

I. Summary of the Office Action

Claims 1-39 are pending in the above-identified application; and claims 21-24, 36 and 39 have been withdrawn due to a restriction requirement. Claims 1-20, 25-35, 37 and 38 stand rejected under 35 U.S.C. §102(b), and claim 8 is objected to. With this response, claims 1, 9, 28 and 37 have been amended to correct minor typographical errors. No new matter is added by amendment. Reconsideration of the claims, in light of the remarks that follow, is requested.

II. Examiner Interview

The undersigned attorney thanks Examiners Coleman and Nguyen for the telephone interview of February 9, 2005, in which agreement was reached (pending a further search).

Specifically, and in accordance with 37 CFR § 133:

- Claims 1-20, 25-35, 37 and 38 were discussed
- U.S. Patent 5,655,952 to Meikle et al. was discussed
- Thrust of argument presented: Meikle did not explicitly disclose a pad conditioning model, nor did it clearly disclose a model including a conditioning parameter having maximum and minimum values.

Applicants provide the following remarks in accordance with the aforementioned interview.

II. Objection of the Claims

Appl. No. : 09/998,384
Amendment Dated : February 16, 2005
Reply to Office Action of : August 25, 2004

Docket No. 005916/USA/FET/FET/DV

Claim 8 is objected to due to informalities arising from the use of the term “prediction error.” The term “prediction error” is recited in claim 8 as “ $(k - (k_I))$ ”, which is the difference between the measured wafer material removal rate (k) and the calculated wafer material removal rate (k_I). Each of these elements is described in the specification. There is nothing in this term that renders the claim not “patently enforceable.” Accordingly, the objection may be withdrawn.

III. Rejection of the claims over Meikle et al.

(1) Claims 1-20, 25-35, 37 and 38 stand rejected under 35 U.S.C. §102 (b), as being anticipated by United States Patent No. 5,655,951 to Meikle et al. (“Meikle”). Applicants respectfully traverse the rejection.

Meikle discloses a “method for selectively reconditioning a polishing pad to provide better control of the polishing rate of a wafer, better estimates of the polishing rates of a specific wafer just before it is planarized, and better uniformity of the planarized surface” (col. 4, l. 19-24). Meikle discloses that there is a “general straight line relationship between wafer polishing rates and changes in pad thickness per conditioning cycle” (col. 6, l. 9-11) and “tests may be performed to develop the specific straight-line relationship between wafer polishing rates and the change in pad thickness per conditioning cycle for each set of operating parameters that are to be used” (col. 6, l. 26-30). However, there is no teaching or appreciation of a pad wear and conditioning model that defines wafer material removal rate as a function of a pad conditioning parameter having “maximum and minimum values,” as recited in each independent claim 1, 25, 37 and 38. The maximum and minimum values of the conditioning parameter serve, in part, to

Appl. No. : 09/998,384
Amendment Dated : February 16, 2005
Reply to Office Action of : August 25, 2004

Docket No. 005916/USA/FET/FET/DV

avoid overconditioning of the polishing pad, a feature that is not disclosed or appreciated by Meikle.

In addition, Meikle asserts that the process provides “better *estimates* of the polishing rates of a specific wafer just before it is planarized” (emphasis added) (col. 4, l.19-21).

Consequently, Meikle does not teach “*determining a wafer removal rate* occurring during said polishing step,” as is recited in independent claims 1, 37 and 38. At no point in the Meikle process is the actual material removal rate of the wafer determined; only an estimated polishing rate is ascertained.

Lastly, Meikle does not teach “calculating updated *pad conditioning parameters* based upon said determined *wafer material removal rate*,” as is suggested in the Office Action at page 5. To the contrary, Meikle calculates updated *wafer polishing parameters* based upon the measured amount of *polishing pad material removal*. The difference between these two approaches is *significant*. Meikle measures the thickness of the polishing pad, determines the deviation of the measured pad thickness from the target thickness and adjusts the polishing time for each wafer in accordance with the deviation from the target. See, column 6, lines 33-52. This results in a *different polishing time for each wafer*. In contrast, claims 1, 37 and 38 define a target wafer material removal rate, and adjust pad conditioning parameters to meet the target, so that *polishing time is consistent and predictable*.

For the forgoing reasons, Meikle does not anticipate claims 1, 25, 37 and 38 and those dependent thereon.

Appl. No. : 09/998,384
Amendment Dated : February 16, 2005
Reply to Office Action of : August 25, 2004

Docket No. 005916/USA/FET/FET/DV

(2) Claims 8, 12, 14-20, 35 and 3 stand rejected under 35 U.S.C. §103 (a), as being obvious over United States Patent No. 5,655,951 to Meikle et al. ("Meikle"). Applicants respectfully traverse the rejection.

With regard to claims 8, 12, 14-20, 35 and 3, the Office Action states that "is it not inventive to discover the optimum or workable range of a results-effective variable within given prior art conditions by routine experimentation" (page 13 of the Office Action dated August 25, 2004).

For the reasons set forth above with respect to anticipation of claims 1-20, 25-35, 37 and 38, Meikle does not teach or suggest even the fundamental elements of the claimed invention, let alone suggest optimization of features disclosed in the prior art. Specifically, Meikle fails to teach or suggest a pad conditioning model including a "conditioning parameter having maximum and minimum value," "determining a wafer removal rate occurring during said polishing step," and "calculating updated pad conditioning parameters based upon said determined wafer material removal rate," so as to "maintain wafer material removal rates within the maximum and minimum removal rates," as recited in claims 1, 25, 37 and 38.

As noted above, the process of Meikle achieves completely the opposite result by varying the polishing time to adjust for changes in the polishing rate.

For the foregoing reasons, Meikle does not render obvious any of claims 1-20, 25-30, 37 and 38.

Appl. No. : 09/998,384
Amendment Dated : February 16, 2005
Reply to Office Action of : August 25, 2004

Docket No. 005916/USA/FET/FET/DV

IV. Miscellaneous

It is submitted that the claims as amended, in view of the remarks provided herein, are in condition for allowance. A favorable Notice to this effect is respectfully requested.

Initialed copies of PTO Form 1449 submitted with Information Disclosure Statements on 9/19/2002, 11/19/2002, 12/31/2002, 4/25/2003, 7/3/2003, 10/9/2003, 12/18/2003, and 8/11/2004 have not been received. Applicant requests that the Examiner provide initialed copies of the above-noted PTO Form 1449 in the next communication with Applicant.

A Petition for a three-month extension of time accompanies this Reply and the Commissioner is authorized to charge any fees associated with this Petition to our Deposit Account No. 08-0219. If there are any other charges, or any credits, please apply them to Deposit Account No. 08-0219.

Respectfully submitted,

Date: February 16, 2005

Mary Rose Scozzafava

Mary Rose Scozzafava
Reg. No. 36,268

**Wilmer Cutler Pickering
Hale and Dorr LLP**
60 State Street
Boston, Massachusetts 02109
Telephone (617) 526-6015
Facsimile (617) 526-5000